Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (previously presented) A splitter comprising:

a substantially single-mode input waveguide;

at least two output waveguides; and

a non-adiabatic tapered waveguide optically coupled between the input waveguide and the output waveguides;

said waveguides being formed on a substrate; wherein

the non-adiabatic tapered waveguide, along at least a portion of its length, widens in width towards the output waveguides, in a plane parallel to the substrate,

the non-adiabatic tapered waveguide merges substantially continuously with the input waveguide in a direction parallel to the optical axis of the input waveguide, and

the non-adiabatic tapered waveguide has a shape that forms a double-peaked field at the junction between the tapered waveguide and the output waveguides, each of the peaks entering a respective one of the output waveguides.

2. (original) A splitter according to claim 1, wherein at least an initial portion of the non-adiabatic tapered waveguide proximal to the input waveguide has a taper angle which increases towards the output waveguides.

3. (previously presented) A splitter according to claim 2, wherein the non-adiabatic waveguide tapers gradually so as to excite a second order mode therein.

4. (original) A splitter according to claim 3, wherein the length of the non-adiabatic tapered waveguide, in a direction parallel to the direction of propagation of an optical signal therein, is such that the phase difference between the fundamental and second order modes, at an output end of the non-adiabatic tapered waveguide is equal to $M\pi$ where M=1,3,5, ...

5. (previously presented) A splitter according to claim 2, wherein the non-adiabatic tapered waveguide tapers symmetrically with respect to the direction of propagation of an optical signal therein.

6. (original) A splitter according to claim 5, wherein the non-adiabatic tapered waveguide has opposing tapered sides each having a taper shape based on a perturbed cosine curve.

7. (previously presented) A splitter according to claim 2, wherein said output waveguides are substantially single mode waveguides.

8. (original) A splitter according to claim 7, wherein at least one of the output waveguides has an adiabatically tapered end which is connected to an output end of the non-adiabatic tapered waveguide and which widens in width towards the non-adiabatic tapered waveguide.

9. (previously presented) A splitter according to claim 2, wherein there is a gap between an output end of the non-adiabatic tapered waveguide and respective ends of the output waveguides optically coupled thereto.

10-12. (canceled)

13. (previously presented) A splitter according to claim 1, wherein the non-adiabatic tapered waveguide has a shape in a plane parallel to the substrate that excites a second order mode therein but substantially no mode higher than the second order mode.

14. (canceled)

15. (previously presented) A splitter according to claim 1, wherein the first and second output waveguides are separated from each other transversely by a blunt,

and wherein the multi-peaked field has a local intensity minimum at the blunt.

16. (new) A splitter according to claim 1, wherein the tapered waveguide has a propagation direction, the tapered waveguide having a non-adiabatic taper in a plane parallel to the substrate, the taper having a curvilinear shape defined by the following equations:

$$w(t) = w_{in} + \frac{w_{out} - w_{in}}{2}\left[1\text{-}\cos(\pi t)\right]$$

$$z(t) = L\left[t + \frac{p}{2\pi}\sin(2\pi t)\right]$$

$$t = [0..1]$$

where L is the length of the non-adiabatic tapered waveguide,

w(t) is the width of the waveguide along the propagation direction,

z(t) is a position along the propagation direction,

win and wout are the widths of the input and output ends, respectively, of the tapered waveguide, and

p is a shape factor.

17. (new) A substrate supporting:

a tapered waveguide having a propagation direction, the waveguide having a non-adiabatic taper in a plane parallel to the substrate, the taper having a curvilinear shape defined by the following equations:

$$w(t) = w_{in} + \frac{w_{out} - w_{in}}{2}\left[1\text{-}\cos(\pi t)\right]$$

$$z(t) = L\left[t + \frac{p}{2\pi}\sin(2\pi t)\right]$$

$$t = [0..1]$$

where L is the length of the non-adiabatic tapered waveguide,

w(t) is the width of the waveguide along the propagation direction,

z(t) is a position along the propagation direction,

win and wout are the widths of the input and output ends, respectively, of the tapered waveguide, and

p is a shape factor.

18. (new) Apparatus according to claim 17, wherein p has a value between 0 and 10.

19. (new) Apparatus according to claim 17, wherein p has a value between 0 and 1.

20. (new) Apparatus according to claim 17, wherein p has a value between 0.6 and 0.9.